Does the DOSPERT scale predict risk-taking behaviour during travel? A study using smartphones

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Abstract: Background Despite the continuing growth of international tourism, very little research has been done on the link between individual risk attitudes and health behaviours during travel. Our study uses a validated risk-taking questionnaire Domain-Specific Risk-Taking Scale (DOSPERT) and data from a smartphone application to study the association between pre-travel risk attitudes and the occurrence of behaviours during travel. Methods A prospective cohort of travellers to Thailand used a smartphone application to answer a daily questionnaire about health behaviours and events. Prior to travel, participants completed the DOSPERT, a validated 30-item scale that assesses risk-taking and perception in five content domains: financial decisions, health/safety, recreational, ethical and social decisions. Multiple linear regression models were used to model the relationship between DOSPERT risk-taking subdomain score and health behaviour. Results Of the 75 travellers that completed the study, 70 (93.3%) completed the DOSPERT pre-travel. Men, backpackers and young travellers reported a higher willingness to take recreational risks than women, luxury travellers and older travellers. Incidence of drug and alcohol risk behaviours during travel, itching from mosquitoes, smoking and failing to use a seatbelt in automobiles while at home were all significantly associated with an individual's score on the health and safety DOSPERT subdomain. Conclusions In our study, individual scores on risk-taking in the health and safety subdomain of the DOSPERT questionnaire seem to be predictive of health behaviours both during travel and at home. By pairing new methods of data collection with questionnaires such as DOSPERT that identify key traveller characteristics to intervene on, travel medicine doctors will be able to provide more specialised health advice, ensuring that all travellers receive well-rounded advice about the full range of health challenges they will face during travel.

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Does the DOSPERT scale predict risk taking during travel? A study using smartphones to track health behaviours of Swiss travellers to Thailand

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Abstract

Background

Despite the continuing growth of international tourism, very little research has been done on the link between individual risk attitudes and health behaviours during travel. Our study uses a validated risk-taking questionnaire (DOSPERT) and data from a smartphone application to study the association between pre-travel risk attitudes and the occurrence of behaviours during travel.

Methods

A prospective cohort of travellers to Thailand used a smartphone application to answer a daily questionnaire about health behaviours and events. Prior to travel, participants completed the DOSPERT, a validated 30-item scale that assesses risk-taking and perception in five content domains: financial decisions, health/safety, recreational, ethical, and social decisions. Multiple linear regression models were used to model the relationship between DOSPERT risk-taking subdomain score and health behaviour.

Results

Of the 75 travellers that completed the study, 70 (93.3%) completed the DOSPERT pre-travel. Men, backpackers, and young travellers reported a higher willingness to take recreational risks than women, luxury travellers, and older travellers. Incidence of drug and alcohol risk behaviours during travel, itching from mosquitoes, smoking, and failing to use a seatbelt in automobiles while at home were all significantly associated with an individual's score on the health and safety DOSPERT subdomain.

Conclusions

In our study, individual scores on risk-taking in the health and safety subdomain of the DOSPERT questionnaire seem to be predictive of health behaviours both during travel and at home. By pairing new methods of data collection with questionnaires such as DOSPERT that identify key traveller characteristics to intervene on, travel medicine doctors will be able to provide more specialised health advice, ensuring that all travellers receive well-rounded advice about the full range of health challenges they will face during travel.

Keywords

mHealth, travel medicine, risk perception, epidemiology, health behaviour

Background

As tourism grows globally, topping 1.3 billion international arrivals in 2017,[1] the demand for evidence-based medical advice prior to departure has also become a pressing issue. While infectious disease prevention during travel has been well addressed in both research and clinical practice (e.g. vaccines, malaria prophylaxis),[2,3] the link between behavioural advice given pre-travel by the travel medicine practitioner and actual health outcomes during travel remains unclear.[4–8] Many new travellers are groups at special risks, ranging from elderly retirement travellers to young travellers doing extreme sports.[9–12] Despite the clear need for specialised and effective advice for these distinct health risk profiles,[13] pre-travel medical consultations often rely on blanket medical advice based on destination, and neglect non-infectious disease advice. The limited evidence base for providing effective behavioural health advice and targeting it to the appropriate travellers means that many are unprepared for the health risks they may face during travel.

Risk taking attitudes and risk perception have been clearly linked in several studies to health behaviour,[14] and tools have been developed by psychologists to measure the risk taking attitude of individuals in different domains.[15] These tools have yet to be used in the discipline of travel medicine, a field where health outcomes are strongly dependent on individual risk taking during travel. A short questionnaire to help identify traveller's risk attitudes prior to the consultation may help travel medicine practitioners to target behavioural advice to those travellers most likely in need. While some research has been done on risk perception among travellers,[16,17] our study is the first to our knowledge to be able to link information on risk attitudes to prospective data on actual incidence of health events and health risk behaviours during travel.

In this analysis, we aimed 1) to describe risk perception and risk taking among travellers to Thailand, especially differences in demographic subgroups, and 2) determine if the results of a validated risk perception questionnaire are predictive of health risk behaviours during travel.

Methods

Study population

A prospective cohort of 100 travellers to Thailand was recruited from the travel clinics of Zurich and Basel (Switzerland) between January and June of 2015.[18–20] Travellers were eligible to participate in the study if they were planning travel to Thailand in 2015, were 18 years or older, were travelling for less than 5 weeks, and were able and willing to use a smartphone during travel. To participate in the study, travellers agreed to 1) complete a pre-travel questionnaire with complete self-reported demographic and medical information, 2) complete a pre-travel questionnaire assessment of risk perception, and 3) download the study smartphone application (TRAVEL app) and complete a daily electronic questionnaire on health risk behaviours and health events during travel.

Study participants were considered to have completed the study when they had completed at least 1 survey during travel and did not ask to be removed from the study.

Study recruitment, questionnaire development, and study methodology are described in detail elsewhere.[18] The study was approved by the Ethics Commission of the Canton of Zurich (KEK-ZH-Nr. 2014-0470).

Pre-travel measurement of attitudes towards risk taking and risk perception: DOSPERT

To assess perception of risk among the study travellers, a literature search was conducted to identify a validated questionnaire capable of assessing risk perception among travellers. DOSPERT (Domain Specific Risk-Taking Scale) was chosen because it was 1) available in the German language, 2) previously validated, and 3) has high reliability.

DOSPERT is a validated 30-item scale that assesses risk-taking in five content domains: financial decisions, health/safety, recreational, ethical, and social decisions (citation from website). Participants were asked to fill out the same DOSPERT questionnaire twice, first rating their likelihood to engage in the behaviour, and on the second pass to rate their perception of how risky the behaviour is. The ratings on the first questionnaire were summed across subdomains to calculate individual "risk taking" scores, and the ratings on the second questionnaire were summed across subdomains to calculate individual "risk perception" scores. All participants therefore had a DOSPERT "risk taking score" and a DOSPERT "risk perception score." Higher scores correspond, respectively, to a greater likelihood of engaging in risk behaviours in that subdomain and a higher perception of the risk inherent in engaging in the risk behaviours in that subdomain. The DOSPERT questionnaire is available as an appendix.To interpret the scores of the study population, the overall subdomain means are compared to the scores of the general population in a 2006 DOSPERT validation study.[15]

Participants were also asked in the written pre-travel demographic and medical information questionnaire to report on the following risk activities in Switzerland: routine seatbelt use in automobiles, helmet use during bicycling, and whether they had a sports injury in the past year. While using seatbelts in an automobile in Switzerland is mandatory, helmet use during bicycling is not. Smoking status, age, and sex were also recorded.

Measurement of health risk behaviours during travel

During study design, key health risk behaviours and health events during travel were identified by focus groups with experts and developed into a questionnaire using cognitive debriefings with previous travellers to Thailand. The risk behaviour domains identified included food and drink risk behaviours (e.g. drinking unpurified tap water, eating food from a street vendor), engaging in drinking and drug risk behaviours (e.g. drinking until intoxication, taking marijuana or another drug), mosquito protection behaviours (e.g. using insect spray, using a bed net at night), and public transportation/accident risk behaviours (e.g. taking public transportation without a seatbelt or on an unpaved road; public transportation included bus, taxi, tuk-tuk, and mototaxi).

Study participants were then asked to answer the resulting questionnaire about health behaviour in Thailand daily during their trips using a smartphone application (the TRAVEL app) developed for study purposes. To calculate an overall incidence measure for each risk behaviour domain, the total number of risk behaviours reported per day was summed up over the course of the trip

and then divided by the total number of questionnaire-days the participant completed during their trip.[19,20]

Analysis

Participants were included in the analysis if they completed at least 27/30 (90.0%) of the DOSPERT items prior to travel; the results of missing items were omitted only from the affected subdomain. The domain-specific means and their standard deviations are reported for the study population as a whole, and for relevant subgroups (e.g. sex, age group, travel type, smoking status, and two categories of health risk behaviours in Switzerland). Overall risk taking attitudes are compared to those in the 2006 validation study for the 30-item version of DOSPERT[15]. Analysis of variance (ANOVA) tests were used to determine whether scores on subdomains differed significantly from each other; Tukey's test was used to make pairwise comparisons between subdomain scores and the corresponding p-values are reported.

To model the relationship between health behaviour domain (outcome) and DOSPERT risk-taking subdomain score (predictor), multiple linear regression models were used. Regression coefficients and p-values were reported. DOSPERT risk taking scores (outcome) were also modelled as a result of risk behaviours in Switzerland and DOSPERT risk perception scores. All models were adjusted by age and sex.

All analyses were done in R version 3.4.0.

Results

Of the 101 eligible participants who enrolled in the study, 75 completed the study. Participants spent a median of 14.0 days in Thailand (range: 4-70) and completed the daily health survey for a median of 85.0% of their travel days. The full study cohort is described in greater detail elsewhere.[18–20] Of those who completed the study, 5 (6.7%) did not complete the DOSPERT scale prior to their trips and were omitted from the analysis. Of these 70 participants, 69 (98.6%) filled out the DOSPERT risk-taking scale completely, and one participant (1.4%) was missing one item under the recreational subdomain. Of the 70 participants, 61 filled out the DOSPERT risk perception scale completely, and 9 were missing one item each from the ethical and financial domains.

The 70 participants who completed DOSPERT at least partially were 38.6% male (n=27), and aged a median of 27.5 years, similar to the overall study population (37.3% male, median 27.0 years).

General risk taking and risk perception attitudes among travellers to Thailand

Overall means for willingness to take risks are calculated across the 5 subdomains in Table 1, with the lowest scores on the ethical subdomain (13.3, SD=4.3) and highest on the recreational and social subdomains (respectively 22.7, SD=7.7 and 30.8, SD=5.2). This overall pattern is similar to that found in the 2006 validation study, but Swiss travellers scored lower on their willingness to take risks in every subdomain except recreational; Swiss travellers scored particularly low on their willingness to take ethical or financial risks (Figure 2).

Overall means for perception of the "riskiness" of behaviours in each subdomain are also summarised in Table 1. The overall means were much closer to those of the 2006 validation study (Figure 2), with only the financial domain showing more than 2 points of difference (Swiss perception of the riskiness of financial decisions was on average 2.4 points higher than that of the validation study).

An analysis of variance (ANOVA) on these scores showed significant variation ($p<0.001$) in average willingness to take risks in different subdomains. A post-hoc Tukey test showed that the willingness to take social risks, the highest overall mean (30.8), is significantly higher than the willingness to take a risk in any other subdomain. Recreational risk taking, the second highest score on average (22.7), was significantly higher than that of all other subdomains other than social risk taking ($p<0.001$). The willingness to take health and safety risks was only significantly higher than the willingness to take ethical risks ($p<0.001$). Willingness to take financial and ethical risks were similarly low ($p=0.52$).

Differences in risk attitudes among traveller subgroups

The differences in risk attitudes in several key subgroups are summarised in Table 2. Between men and women, the main difference is that men report greater willingness to take recreational risks (25.3 vs. 21.0). Willingness to take recreational risks was highest in the youngest cohort and dropped in each successive older age group. Similarly, backpackers were much more likely to be willing to take recreational risks than luxury travellers (25.7 vs. 17.4). Smokers/former smokers and non-smokers were similar in all risk subdomains except health and safety, where smokers and former smokers were more likely to take risks. Those who did not wear a helmet while bicycling in Switzerland were also more likely to take health and safety risks and recreational risks than those who always wore a helmet while biking.

Domain score and prediction of health risk behaviour during travel

Multiple linear regression was used to predict health risk behaviour in each domain (outcome) based on DOSPERT subdomain score in the 69 participants who fully completed the DOSPERT risk-taking survey (Table 3). Only health and safety, recreational, and social risk-taking scores were considered as predictors, as ethical and financial risk-taking among this cohort was very low. When incidence of drug and alcohol risk behaviours (e.g. drinking to the point of inebriation, taking marijuana or another drug) was predicted it was found that DOSPERT score on the health and safety domain (Beta = 0.03, p =0.01) was a significant predictor and age (Beta = 0.01, p =0.07) was marginally significant. The overall model fit was $R^2 = 0.18$. When incidence of itching from mosquitoes was predicted it was found that DOSPERT score on the health and safety domain (Beta = 0.03, p =0.02) was a significant predictor. The overall model fit was $R^2 = 0.21$.

None of the other predictors (social risk taking score, recreational risk taking score, sex) were found to be significantly associated with the incidence of health behaviours (food and drink risk behaviours, engaging in drinking and drug risk behaviours, itching from mosquitoes, and public transportation/accident risk behaviours).

To determine whether the health and safety risk risk-taking score is associated with actual risk taking behaviours at home in Switzerland, a linear regression model was used to predict health and safety risk-taking score (outcome) based on smoking status, seatbelt use in automobiles, sports injury in the past year, and helmet use while bicycling. Smoking status (Beta= 2.04, p=0.005) and seatbelt use in automobiles (Beta=-8.65, p<0.001) were significantly associated with health and safety risk score. Sports injuries and helmet use were not associated with the health and safety score. The overall model fit was R^2 = 0.41.

Conclusions

In our study, individual scores on risk-taking in the health and safety subdomain of the DOSPERT questionnaire seem to be predictive of health behaviours both during travel and at home. Incidence of drug and alcohol risk behaviours during travel, itching from mosquitoes , smoking, and failing to use a seatbelt in automobiles while at home were all significantly associated with an individual's score on the health and safety DOSPERT subdomain.

These results suggest that the health and safety subdomain test of DOSPERT may be a useful tool for identifying travellers likely to engage in high risk health behaviours during travel; in particular, the high association of risk behaviours in Switzerland with DOSPERT score on risk-taking indicates that this is a robust measure of willingness to engage in risky behaviours. Some risks during travel, such as drinking to the point of inebriation or taking drugs, were more closely associated with the score on this subdomain than with demographic predictors such as age or gender. It has been shown that behavioural interventions can reduce risk behaviours while at home.[21] Effective behavioural advice administered to these travellers may lessen their risk of exposure to STIs from risky sexual behaviours, accidents or injuries from risky recreational behaviours, or insect-borne disease through lack of mosquito protection.

In addition, clear demographic subgroups of different attitudes towards risk emerged: men, backpackers, and young travellers showed a higher willingness to take recreational risks than women, luxury travellers, and older travellers (Table 2). Smokers and those who did not wear a helmet while bicycling in Switzerland showed a higher willingness to take health and safety risks than non-smokers or those who always wore a helmet. These findings highlight that distinct "risk profiles" exist among different subgroups of travellers; these profiles may provide the basis of creating more specialised advice targeted to subgroups of travellers. However, the range of traveller profiles goes far beyond the 70 travellers that completed the DOSPERT in this study; further studies using the DOSPERT scale could characterise these risk profiles more fully.

The comparison of Swiss scores to those of the 2006 DOSPERT validation study suggest that Swiss travellers have a similar perception of risk to those of other populations (e.g. how "risky" a given activity is), but a lower willingness to participate in risky activities. Swiss travellers appear to have a high willingness to engage in social and recreational risk taking, a lower willingness to take health and safety risks, and very low willingness to engage in ethical or financial risk behaviours, a pattern that is overall similar to that found in previous studies using DOSPERT[15]. The overall lower willingness to participate in "risky" activities in this group of Swiss travellers is somewhat surprising, given that this is a group traveling to a developing country on holiday

and could therefore be seen as adventurous; this lowered willingness to participate in risky activities may reflect cultural differences in acceptable levels of risk, or may reflect that the group of travellers consulting a doctor prior to travel may be more risk averse than the general population. Additionally, it may be that the self-selected group of travellers willing to answer a questionnaire daily during travel may be more risk averse than the general population. Administration of this test in differing traveller populations would help to better understand how attitudes towards risk and "risk profiles" differ across countries and demographic groups.

The rate of missing items was very low on the risk-taking DOSPERT scale, so taking the questionnaire once appears to be acceptable among participants in the study, who were overall representative of the general travel clinic population.[18] However, the higher rate of missing items on the risk perception DOSPERT scale (the second time participants are asked to fill out the survey) suggests that filling out the questionnaire twice may represent too high a burden on participants. It is interesting that only a high score on the health/safety domain is associated with the incidence of health risk behaviours during travel, suggesting that willingness to take risks in other domains is independent of willingness to take health and safety risks. This also suggests that the other subdomain tests, while relevant in other areas of research, may not be useful in the travel clinic setting for predicting traveller health behaviour. Simplifying the questionnaire to only the health and safety subdomain has the added advantage of reducing the burden and time costs. The six questions that make up the health and safety subdomain could be easily added to the pre-travel consultation registration form to help travel medicine practitioners quickly identify those travellers most in need of preventative behavioural advice.

This study has limitations. The small size of this initial cohort of travellers (n=70) makes it difficult to draw final conclusions, as the range of psychological profiles and attitudes towards risk among the full spectrum of travellers is doubtless higher than that captured here. Although we were impressed by the plethora of various issues reported by those few travellers, a larger prospective cohort should provide even more conclusive results. In particular, a larger cohort would allow the association of specific risk behaviours with risk-taking scores; in this cohort, categories were of necessity collapsed into larger categories (e.g. drug and alcohol risk behaviours), which limits the specificity of results. The incidence of itching from mosquitoes, while presumed to be related to mosquito protection behaviours, may also reflect individual susceptibility to mosquito bites or location-based risks; however, the high association of itching from mosquitoes with health and safety attitude scores prior to the trip suggests that health behaviours also play a large role in risk of bites. In addition, while the results here indicate that there is an association between psychological risk profiles and health behaviours during travel, more research is needed on how and which behavioural advice is most effective in preventing risky travel behaviours in those with high risk taking scores on the DOSPERT questionnaire. Prospective randomised testing of behavioural advice with a similar tracking tool to that used in this study would help to identify the advice that is most useful and effective for travellers, and which advice is routinely ignored. While the study population is overall representative of the underlying clinic population, the proportion of women was slightly higher in the study (62 vs. 54%); this may indicate a higher interest in health during travel among women, or may be due to chance.[18]

The use of a smartphone application such as the TRAVEL application during travel to track the health behaviours and outcomes of travellers in almost real time allows travel medicine researchers to look at health outcomes during travel in greater detail than ever before.[22–24] Instead of relying on study questionnaires administered weeks or months after the event, this study was able to prospectively link psychological profiles collected pre-travel and actual health behaviours during the trip, identifying important subgroups of travellers who would benefit from specialised behavioural health advice. In addition, the use of the DOSPERT health and safety risk-taking scale in clinical practice shows great promise in identifying travellers with high likelihood of engaging in behaviours during travel that link to important health risks, such as exposure to STIs, accidents, injuries, and other infectious diseases. By pairing new methods of data collection with questionnaires such as DOSPERT that identify key traveller characteristics to intervene on, travel medicine doctors will be able to provide more specialised health advice than ever before, ensuring that travellers receive well-rounded advice about the full range of health challenges they will face during travel.

Declarations

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Declaration of interests

The authors state that they have no conflicts of interest to declare.

Author Contributions

AF, CH, ES, and MP conceived and designed the study. AF, SZ, CH, and MP analysed and interpreted the data. AF drafted the manuscript and carried out the statistical analysis. All authors critically revised the manuscript for important intellectual content. ES and CH provided administrative, technical, and material support. CH supervised the study.

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Table 1. DOSPERT scale scores for risk taking and risk perception among Swiss travellers, compared with DOSPERT scores in a validation study. The first scale (risk taking) is meant to assess the willingness to take "risks" in different domains. The second scale (risk perception) is meant to assess the perception of how "risky" the given activity is. A higher score indicates a higher willingness to take the risk or higher perception of how risky that activity is, with possible scores ranging from a minimum of 6 to a maximum of 42. The validation study means are included to compare scores of Swiss travellers to those of the general population.

	Mean DOSPERT Subdomain Scores (Possible range: 6-42)				
	Ethical domain	Financial domain	Health and safety domain	Recreational domain	Social domain
DOSPERT Risk Taking Scale					
Validation Study*	16.92	19.61	20.63	22.43	32.58
TOURIST Study	13.33	14.89	17.44	22.65	30.83
Difference in means	3.59	4.72	3.19	-0.22	1.75
DOSPERT Risk Perception Scale					
Validation Study[1]	27.39	26.53	28.15	27.17	17.01
TOURIST Study	26.03	28.90	30.09	26.23	15.89
Difference in means	1.36	-2.37	-1.94	0.94	1.12

*2006 Validation Study[15]

Table 2. Differences among study subgroups on the DOSPERT risk-taking scale, or the willingness to take risks. Higher score indicates a greater willingness to take risks in that category. In the group that did not complete the study, n=19/26 completed the DOSPERT questionnaire. Key differences between subgroups are shown in boxes and bolded.

	Mean DOSPERT Subdomain Scores (SD)				
	Ethical domain	**Financial domain**	**Health and safety domain**	**Recreational domain**	**Social domain**
Overall study	13.33 (4.29)	14.89 (6.34)	17.44 (5.57)	22.65 (7.68)	30.83 (5.19)
Study dropouts (n=19)	14.58 (4.88)	15.11 (6.54)	19.94 (6.19)	23.84 (8.13)	32.16 (4.89)
Male (n=27)	12.85 (3.30)	15.70 (6.76)	18.67 (5.62)	**25.35 (8.57)***	29.52 (6.14)
Female (n=43)	13.63 (4.82)	14.37 (6.09)	16.67 (5.45)	**21.02 (6.67)***	31.65 (4.37)
<age 25 (n=22)	13.04 (3.76)	14.00 (4.77)	17.87 (5.47)	24.50 (7.91)	29.52 (6.05)
Age 25-34 (n=26)	13.92 (5.00)	16.69 (7.98)	19.12 (5.58)	24.00 (6.90)	31.62 (4.79)
Age 35-44 (n=12)	13.08 (4.66)	13.50 (4.81)	14.33 (4.77)	20.33 (6.71)	30.75 (4.20)
>age 45 (n=9)	12.67 (3.12)	13.78 (6.02)	15.67 (5.34)	17.33 (8.44)	32.00 (5.22)
Backpacker (n=33)	13.21 (4.50)	15.39 (6.95)	18.09 (5.72)	**25.73 (7.57)***	31.24 (4.81)
Luxury (n=16)	14.13 (4.77)	15.13 (6.76)	17.00 (4.99)	**17.44 (4.29)***	28.81 (4.12)
Other (n=18)	12.74 (3.48)	14.53 (4.90)	17.00 (5.85)	21.44 (7.27)	31.47 (6.45)
Local stay (n=2)	14.50 (6.36)	8.00 (1.41)	14.50 (7.78)	24.50 (14.85)	34.00 (4.24)
Smoker (n=16)	15.18 (5.19)	16.00 (7.75)	**19.94 (5.43)***	23.25 (8.57)	30.29 (5.17)
Former smoker (n=10)	14.30 (3.95)	15.50 (8.86)	**20.80 (6.05)***	23.10 (7.68)	31.90 (5.59)
Nonsmoker (n=43)	12.37 (3.75)	14.30 (5.04)	**15.67 (4.84)***	22.33 (7.50)	30.79 (5.20)
Never wears a helmet while biking (n=27)	12.30 (3.75)	13.74 (7.28)	**18.37 (5.30)***	24.81 (7.10)	**32.07 (3.66)***
Always wears helmet (n=16)	11.56 (2.71)	14.06 (4.43)	**14.44 (4.55)***	20.50 (8.25)	**29.00 (5.15)***
Severe sports injury in last year (n=5)	14.40 (4.77)	13.00 (4.74)	19.40 (8.44)	19.00 (9.19)	32.20 (4.82)
Moderate sports injury in last year (n=7)	14.50 (6.93)	17.13 (7.55)	17.00 (5.32)	25.43 (9.00)	31.38 (7.11)
Mild sports injury in last year (n=29)	13.10	15.21	17.10	23.48	30.52
No sports injury in past year (n=28)	13.04	14.25	17.57	21.75	30.75

*Means bolded within the box are statistically significantly different from each other according to a Student's t-test for two means (smokers and former smokers were grouped together due to their similar scores).

Table 3. Prediction of health risk behaviour based on DOSPERT risk-taking subdomain score in a multiple linear regression model. The risk-taking scale scores are based on willingness to take risks in that category.

	Beta Coefficient (95% CI)	P-value
Prediction of Drug and Alcohol Risk Behaviours		
Health and Safety Domain Score	**.03 (.007, .06)**	**0.01**
Social Domain Score	-.02 (-.05, .008)	0.17
Recreational Domain Score	.01 (-.01, .03)	0.43
Age	.01 (-.001, .03)	0.07
Sex: Male	.03 (-.3, .3)	0.82
Prediction of Itching from Mosquitoes		
Health and Safety Domain Score	**.03 (.004, .06)**	**0.02**
Social Domain Score	-.004 (-.03, .03)	0.79
Recreational Domain Score	.004 (-.02, .03)	0.73
Age	-.01 (-.03, .002)	0.09
Sex: Male	-.09 (-.4, 0.2)	0.56

Figure 1: Study Flow Diagram. Data collection points pre- and during travel. Questionnaires administered included the DOSPERT assessment prior to travel and a health behaviour and symptoms questionnaire daily during the trip.

Figure 2: Radar Plot. DOSPERT subdomain scores of the study population (dark grey) vs. the general population from validation studies (light grey) for the risk taking subscale and the risk perception subscale.